

Walker Documentation

REV 1.0

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I. Revision History

Edited By	Description	Date	Revision
Paul Ulezko	Release	12/17/2011	1.0

II. Parts List

Part	Description	Quantity
Arduino Mega 2560 Microcontroller	Brain	1
Sabertooth Dual 12A Motor Driver	12V 10A	1
AME 218-Series 12V 212 in-lb Gearmotor	12V 10A Motors	2
Freewheel Motors	Wheel Locks	2
Sharp GP2D12 IR Sensors	IR Sensors	6
Phidgets Mini Joy Stick	Direction Control	1
On/Off Power Button	12V 12A Max	2
Digital Yellow Button	Switch for 2 Modes	1
Lead Acid Battery	12V 10A	1

III. Hardware List

Part	Description	Quantity
28 AWG Wire	Red – Power	50'
28 AWG Wire	Black – Ground	50'
28 AWG Wire	Yellow - Signals	50'
Shrink Tubing	Black	4 boxes
Screws	Different Length	90
Nuts	One Size	80
Lock Washers	One Size	80
Spacers	Different Lengths	10
PCB Board		3

IV. Main Power Connections From Battery

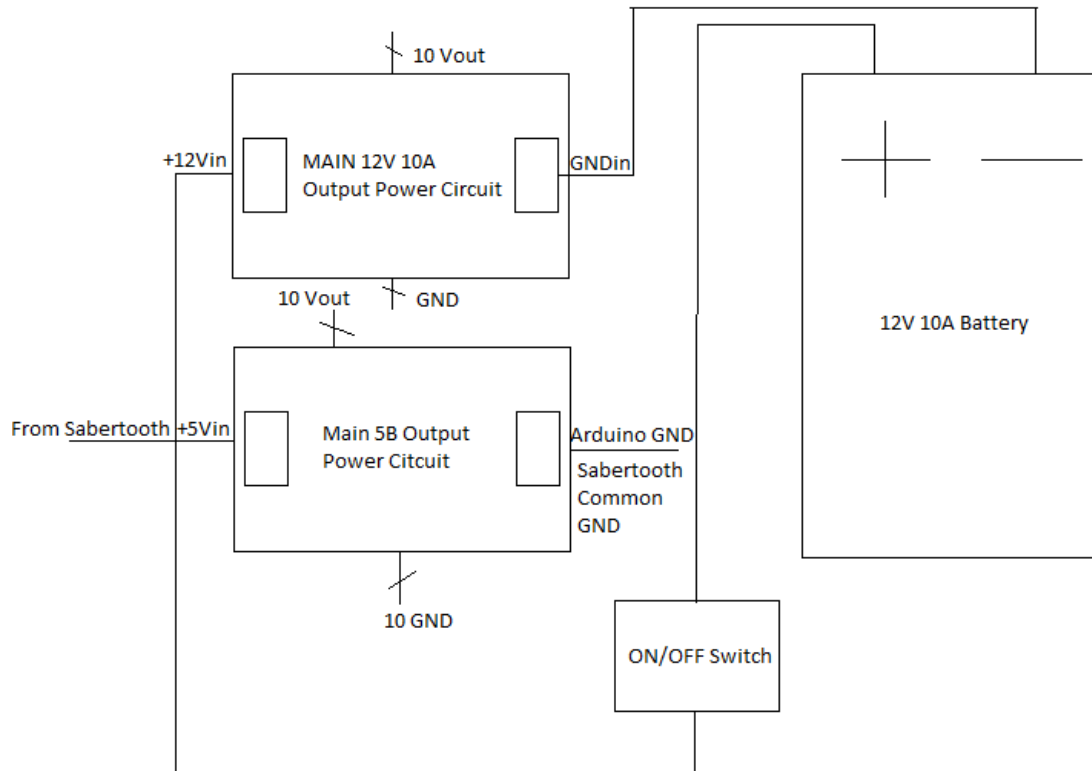


Figure 1 – Showing the main power supply circuit. All the sensors are using 5V lines and have common ground between Sabertooth and Arduino microcontroller. Main 12V 10A Output Power Circuit acts as an external power circuit for future projects. 10 Vout is used to power all sensors and will provide extra output power for future extra sensors. Note common ground between Arduino and Sabertooth is absolutely necessary.

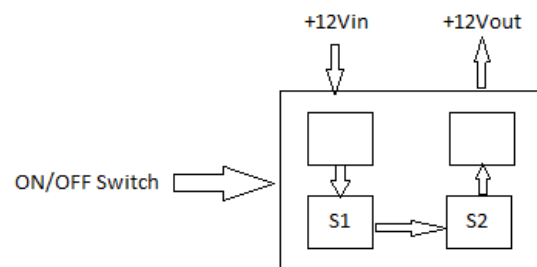


Figure 2 – Showing ON/OFF main power switch to activate all the system. The switch is located on the left side of the walker and is further away from the user. S1 and S2 are the switch connections. The main 12V 10A positive power is flowing through the connector. When turned off the positive line is disconnected and thus no power is present in the circuit.

V. Main Power Connections for Free Wheel Lock

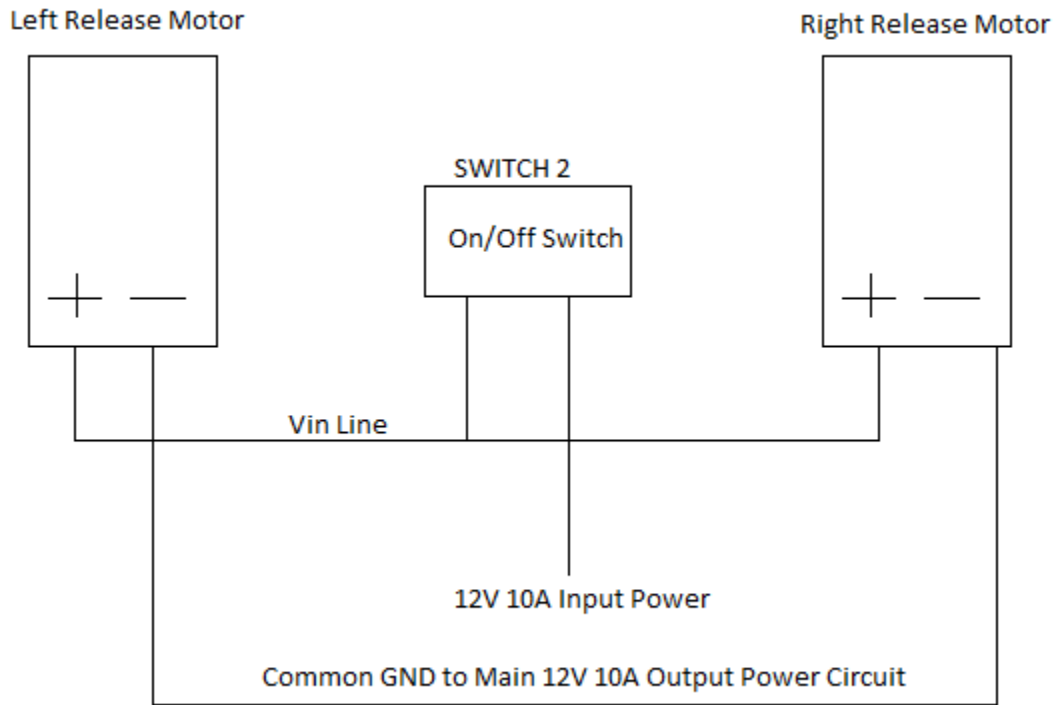


Figure 3 – Showing the free wheel anti-lock motor circuit. Once powered the motors lift the lever to release the motors from locking. The power is constantly used once in this mode. 12V 10A Input power comes in from the MAIN 12V 10A Output Power Circuit as shown in Figure 1. Common ground must be established in order to work properly. The switch shown is not the same as in Figure 1. The SWITCH 2 is used only for free wheel mode.

VI. Main Circuit

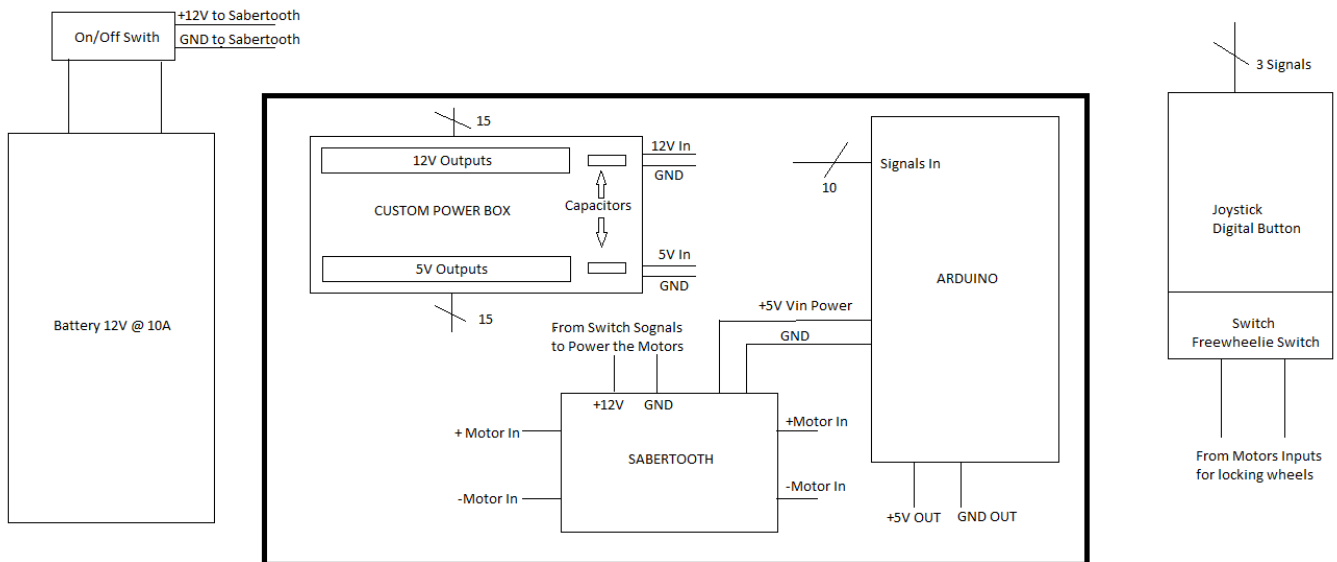


Figure 4 – Showing the main circuit. Walker has 6 Sharp IR sensors to avoid obstacles. Phidgets joy stick for the user to control direction. Sabertooth controls two DC motors and output 5V power to Arduino. The power circuit provide external power and has free ports for the future sensors and hardware.

VII. Hardware Connections

IR Sensors

Arduino	Sharp IR Sensor
A3	Left Front
A4	Left Rear
A5	Right Front
A6	Right Rear
A7	Center Left
A8	Center Right

Sabertooth - Arduino

Arduino	Sabertooth
Pin 18	S1

Sabertooth – Motors

Sabertooth	Motors
M1-	GND
M1+	+12V
M2-	GND
M2+	+12V

Phidgets Joy Stick

Arduino	Joy Stick
A0	X-Axis
A1	Y-Axis

VIII. Walker User Manual

DANGER: BEFORE REPLACING ANYTHING TURN OFF MAIN POWER SWITCH DUE TO HIGH CURRENT AND FOR YOUR OWN SAFETY!

Battery Connection

Before replacing the battery make sure the main power switch is set to off. Clip red alligator onto positive lead on the battery marker with red color. Then clip the black alligator onto black lead on the battery marker with black color. Note the battery should be no less than 11V left.

Adding/Replacing New Sensors

Attach the desired sensor(s) to walker. Run the wires to Arduino and power circuits. Make sure to use correct power supply circuit. Damage might occur if connected to the wrong power circuit due to high current. Sabertooth and Arduino has a common ground already.

Replacing the Motors

The task should be left to a professional

Replacing Sabertooth

Refer to the Sabertooth datasheet for wiring directions. If voltages are mixed on the Vin the Sabertooth will burn as not protective circuit exists. To replace it, unscrew all the wires and take off the screws. Replace it with a new one and plug everything back accordingly.

IX. Troubleshooting

Q. What if nothing is functional?

A. Check the battery with multimeter as voltage should be no less than 11V.

Q. Why is Arduino not programming?

A. Check USB is connected into your PC. Make sure the computer recognizes and has Arduino software. Sometimes data from sensors might interfere with programming the board and might require removing it.

Q. Why sensor(s) is not working?

A. Sometimes the sensor tend to fail due to voltage spikes or shorts and might require replacing one. All you would need to do is to unplug the sensor, take off the screws, and replace the sensor. No soldering is required unless adding new sensors.

Q. Why am I hearing a strange noise from the motor(s)?

A. A damage might have occurred to the motor gear(s) and might need replacement of a certain part of a new motor might be in order.

Q. Why Arduino is not working after adding new part?

A. Check your power connections as something is wired incorrectly. Incorrect power wiring will cause Arduino to stay off.